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(71)【出願人】
【識別番号】000001889
【氏名又は名称】三洋電機株式会社
【住所又は居所】大阪府守口市京阪本通2丁目5番5号
(71)【出願人】
【識別番号】397016703
【氏名又は名称】三洋電子部品株式会社
【住所又は居所】大阪府大東市三洋町1番1号
(72)【発明者】
【氏名】寺司 和生
【住所又は居所】大阪府大東市三洋町1番1号 三洋電子部品株式会社内
(72)【発明者】
【氏名】大野 卓爾

【住所又は居所】大阪府大東市三洋町1番1号 三洋電子部品株式会社内
(74)【代理人】
【識別番号】100100114
【弁理士】
【氏名又は名称】西岡 伸泰
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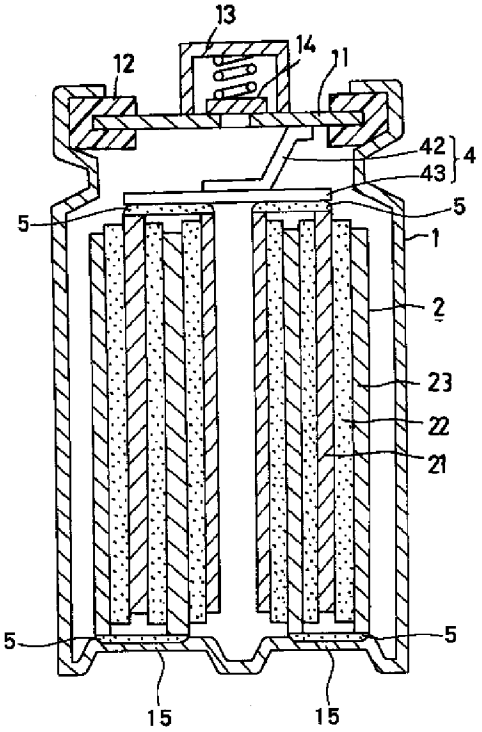
要約

(57)【要約】
【課題】有底筒状を呈する金属製の負極缶1の開口部に封口板11を固定して、内部に巻き取り電極体2を設置した電気エネルギー蓄積デバイスにおいて、部品点数の削減と軽量化を図る。
【解決手段】本発明に係る電気エネルギー蓄積デバイスにおいて、負極缶1の底部には、巻き取り電極体2側へ突出する複数の凸部15が一体に成型され、巻き取り電極体2の正極21及び負極23の端部には、それぞれ複数の集電部5が形成され、負極缶1の各凸部15が負極23の各集電部5にレーザ溶接されている。



請求の範囲

【特許請求の範囲】

【請求項1】有底筒状を呈する電極缶の開口部に封口板を固定して、内部に電極室を形成し、該電極室には、正極(21)と負極(23)の間にセパレータ(22)を介在させてなる電極体(2)が設置され、封口板には、電池缶と電気的に絶縁された電極端子が設けられ、正極(21)及び負極(23)の何れか一方の電極は前記電極缶に連結され、他方の電極は前記電極端子に連結されている電気エネルギー蓄積デバイスにおいて、電極缶の底部には、電極室側へ突出する1或いは複数の凸部(15)が一体に成型され、該凸部(15)が前記一方の電極の端部に溶接されていることを特徴とする電気エネルギー蓄積デバイス。
【請求項2】正極(21)及び負極(23)はそれぞれ、帯状芯体の表面に活物質を塗布して構成され、少なくとも前記一方の電極の端部には、活物質の塗布されていない非塗工部が形成され、該非塗工部の端縁に、電極体(2)の端面に露出する集電部(5)が形成され、該集電部(5)に前記電極缶の凸部(15)が溶接されている請求項1に記載の電気エネルギー蓄積デバイス。
【請求項3】電極体(2)の一方の端部には、前記一方の電極の非塗工部の端縁が間隔をあけて並び、集電部(5)は、前記非塗工部の端縁に係合する融着部材を融着させたものである請求項2に記載の電気エネルギー蓄積デバイス。
【請求項4】電極体(2)の一方の端部には、前記一方の電極の非塗工部を折り畳んで電極端面が形成され、集電部(5)は、前記電極端面に金属薄膜を被着形成したものである請求項2に記載の電気エネルギー蓄積デバイス。
【請求項5】電極缶の裏面側から凸部(15)に対してレーザビームを照射することによって、前記一方の電極の端部に凸部(15)がレーザ溶接されている請求項1乃至請求項4の何れかに記載の電気エネルギー蓄積デバイス。

詳細な説明

【発明の詳細な説明】
【0001】
【発明の属する技術分野】本発明は、ガソリン自動車のイグナイタ用の電源や、ハイブリッド自動車や電気自動車の回生制動エネルギーを蓄電するための蓄電器等として用いられる、電気二重層コンデンサー、リチウムイオン二次電池などの電気エネルギー蓄積デバイスの構造に関するものである。
【0002】
【従来の技術】従来のリチウムイオン二次電池は、例えば図10に示す様に、負極缶(1)の内部に巻き取り電極体(2)を収容し、該負極缶(1)の開口部に封口板(11)を固定したものであって、負極缶(1)と封口板(11)の間には絶縁部材(12)が介在している。又、封口板(11)には、安全弁(14)を内蔵した正極端子(13)が取り付けられている。これによって、巻き取り電極体(2)が発生する電力を正極端子(13)と負極缶(1)から外部へ取り出すことが出来る。
【0003】巻き取り電極体(2)は、それぞれ帯状の正極(21)、セパレータ(22)、及び負極(23)から構成される。正極(21)は、アルミニウム箔からなる芯体の表面に正極活物質(24)を塗布して作製され、負極(23)は、銅箔からなる芯体の表面に負極活物質(26)を塗布して作製される。正極(21)及び負極(23)はそれぞれセパレータ(22)上に幅方向へずらして重ね合わされて、渦巻き状に巻き取られている。これによって、巻き取り電極体(2)の軸方向の両端部の内、一方の端部では、セパレータ(22)の端縁よりも外方へ正極(21)の端縁が突出すると共に、他方の端部では、セパレータ(22)の端縁よりも外方へ負極(23)の端縁が突出している。
【0004】又、巻き取り電極体(2)の両端部にはそれぞれ集電部材(3)が設置されている。集電部材(3)は、巻き取り電極体(2)の端面に接合された平板部(33)と、該平板部(33)の表面に突設されたタブ部(32)とを具え、正極側の集電部材(3)のタブ部(32)の先端部が、封口板(11)の内面に溶接され、負極側の集電部材(3)のタブ部(32)の先端部が、負極缶(1)の底面に溶接されている。
【0005】
【発明が解決しようとする課題】しかしながら、図10に示す従来のリチウムイオン二次電池においては、巻き取り電極体(2)の両側に集電部材(3)(3)を配置していたため、部品点数が多くなるばかりでなく、電池の重量が大きくなる問題があった。そこで本発明の目的は、部品点数の削減と軽量化が可能な電気エネルギー蓄積デバイスを提供することである。
【0006】
【課題を解決する為の手段】本発明に係る電気エネルギー蓄積デバイスは、有底筒状を呈する金属製の電極缶の開口部に封口板を固定して、内部に電極室を形成し、該電極室には、正極(21)と負極(23)の間にセパレータ(22)を介在させてなる電極体(2)が設置され、封口板には、電池缶と電気的に絶縁された電極端子が設けられている。電極缶の底部には、電極室側へ突出する1或いは複数の凸部(15)が一体に成型され、正極(21)及び負極(23)の何れか一方の電極の端部は、前記電極缶の凸部(15)と溶接され、他方の電極の端部は、前記電極端子と連結されている。
【0007】上記本発明の電気エネルギー蓄積デバイスにおいて、前記一方の電極の端部は、電池缶の凸部(15)に直接に溶接されて、電池缶との電気的接続が為されている。前記他方の電極の端部は、例えば従来と同様の集電部

材を介して、電極端子と連結されて、電極端子との電気的接続が為されている。従って、電極体(2)が発生する電力を、電極缶と電極端子から外部へ取り出すことが出来る。

【0008】電極体(2)の前記一方の電極の端部を電池缶の凸部(15)に溶接する工程においては、先ず、電池缶の内部に電極体(2)を設置して、前記一方の電極の端部を凸部(15)に接触させる。この際、凸部(15)は、電池室側へ突出しているので、電極の端部と凸部(15)とは確実に接触する。この状態で、電極缶の裏面側から凸部(15)に対してレーザビームを照射する。これによって、前記一方の電極の端部と凸部(15)とが溶接されることになる。

【0009】具体的には、正極(21)及び負極(23)はそれぞれ、帯状芯体の表面に活物質を塗布して構成され、少なくとも前記一方の電極の端部には、活物質の塗布されていない非塗工部が形成され、該非塗工部の端縁に、電極体(2)の端面に露出する集電部(5)が形成され、該集電部(5)に前記電極缶の凸部(15)が溶接されている。該具体的構成を有する電気エネルギー蓄積デバイスにおいては、前記一方の電極の非塗工部の端縁に集電部(5)が形成されており、該集電部(5)の表面が電極体(2)の端面に露出しているので、該集電部(5)の表面と電気缶の凸部(15)とが互いに広い面積で接触することとなって、溶接後の集電部(5)と凸部(15)の間の電気抵抗は十分に低いものとなる。

【0010】更に具体的な構成において、電極体(2)の一方の端部には、前記一方の電極の非塗工部の端縁が間隔をあけて並び、集電部(5)は、前記非塗工部の端縁に融着部材を係合させて融着したものである。該具体的構成によれば、融着部材が前記一方の電極の非塗工部と係合した状態で融着されるので、非塗工部と一体となった集電部(5)が形成される。

【0011】又、他の具体的な構成においては、電極体(2)の一方の端部には、前記一方の電極の非塗工部を折り畳んで電極端面が形成され、集電部(5)は、前記電極端面に金属薄膜を被着形成したものである。該具体的構成によれば、非塗工部を折り畳むことによって、該非塗工部の表面からなる電極端面が形成され、該電極端面に金属薄膜が被着形成されるので、非塗工部と広い面積で接触した集電部(5)が形成される。

【0012】

【発明の効果】本発明に係る電気エネルギー蓄積デバイスにおいては、少なくとも一方の電極の端部が、電池缶の底部に一体成型された凸部に対して直接に溶接され、該電極と電極缶の間に従来の如き集電部材は介在していないので、部品点数の削減及び軽量化が可能である。

【0013】

【発明の実施の形態】以下、本発明をリチウムイオン二次電池に実施した形態につき、図面に沿って具体的に説明する。本発明に係るリチウムイオン二次電池は、図1に示す如く、有底円筒状の負極缶(1)の内部に巻き取り電極体(2)を収容して、負極缶(1)の開口部に封口板(11)を固定したものであって、負極缶(1)と封口板(11)の間には絶縁部材(12)が介在している。又、封口板(11)には、安全弁(14)を内蔵した正極端子(13)が取り付けられている。負極缶(1)の底部には、巻き取り電極体(2)側へ突出する複数の凸部(15)が、図4に示す如く放射状に一体成型されている。上記リチウムイオン二次電池においては、巻き取り電極体(2)が発生する電力を正極端子(13)と負極缶(1)から外部へ取り出すことが出来る。

【0014】巻き取り電極体(2)は、図2に示す様に、それぞれ帯状の正極(21)、セパレータ(22)及び負極(23)からなり、正極(21)及び負極(23)はそれぞれセパレータ(22)上に幅方向へずらして重ね合わされ、渦巻き状に巻き取られている。正極(21)は、アルミニウム箔からなる芯体の表面に正極活物質(24)を塗布して構成され、電極長手方向に伸びる一方の端縁に沿って、正極活物質の塗布されていない非塗工部(25)が形成されている。負極(23)は、銅箔からなる芯体の表面に負極活物質(26)を塗布して構成され、電極長手方向に伸びる他方の端縁に沿って、負極活物質の塗布されていない非塗工部(27)が形成されている。

【0015】これによって、巻き取り電極体(2)の軸方向の両端部の内、一方の端部では、渦巻き状に巻き取られた正極(21)の端縁(非塗工部(25))が、セパレータ(22)の端縁よりも外方へ突出すると共に、他方の端部では、渦巻き状に巻き取られた負極(23)の端縁(非塗工部(27))が、セパレータ(22)の端縁よりも外方へ突出することになる(図5参照)。例えば、各電極の活物質塗工部(24)(26)の幅Aは数十mm、非塗工部(25)(27)の幅Bは数mm、セパレータ(22)からの突出距離Sは1～3mm程度に形成することが出来る。

【0016】巻き取り電極体(2)の両端部にはそれぞれ、複数の集電部(5)が、図3に示す如く放射状に形成されている。各集電部(5)は、後述の融着部材を溶接したものであって、図1に示す如く、正極側の集電部(5)は、巻き取り電極体(2)の正極(21)の端縁に一体に形成され、負極側の集電部(5)は、巻き取り電極体(2)の負極(23)の端縁に一体に形成されている。

【0017】正極(21)側の集電部(5)の表面には、アルミニウム製の集電部材(4)が設置されている。該集電部材(4)は、巻き取り電極体(2)の端面に沿って拡がる平板部(43)と、平板部(43)の表面に突設されたタブ部(42)とを具え、平板部(43)の裏面が集電部(5)の表面に抵抗溶接されると共に、タブ部(42)の先端部が封口板(11)の裏面に抵抗溶接されている。又、巻き取り電極体(2)は、負極(23)側の各集電部(5)を負極缶(1)の各凸部(15)に対応させて設置されており、凸部(15)の先端が巻き取り電極体(2)の集電部(5)にレーザ溶接されている。

【0018】上記リチウムイオン二次電池においては、巻き取り電極体(2)の両端部にそれぞれ、電極端縁と一体の集電部(5)が形成されており、集電部(5)と集電部材(4)の間、並びに集電部(5)と負極缶(1)の凸部(15)の間の接触面

積は充分に大きく、接触抵抗が十分に低減されるので、高い集電効率が得られる。又、負極缶(1)に一体成型した凸部(15)によって、巻き取り電極体(2)の負極側の集電部(5)と負極缶(1)との間の確実な接触が図られており、該集電部(5)と負極缶(1)の間には集電部材が介在しないので、従来の如く巻き取り電極体(2)の両側に集電部材(4)(4)を配置した構成に比べて、部品点数の削減及び電池の軽量化が可能である。

【0019】次に、上記リチウムイオン二次電池の製造方法について説明する。従来と同様にして図2に示す巻き取り電極体(2)を作製した後、図5に示す如く、巻き取り電極体(2)の端部に突出した渦巻き状の正極(21)の端縁、即ち非塗工部(25)に、アルミニウム製の複数のコイル部材(6)を放射状に配置して噛合せしめ、各コイル部材(6)の中央部にはアルミニウム製の棒材(61)を貫通せしめる。同様に、渦巻き状の負極(23)の端縁、即ち非塗工部(27)に、銅製の複数のコイル部材(6)を放射状に配置して噛合せしめ、各コイル部材(6)の中央部には銅製の棒材(61)を貫通せしめる。

【0020】その後、各コイル部材(6)及び棒材(61)の設置部に対して、YAGレーザ等を用いたレーザ溶接を施し、コイル部材(6)及び棒材(61)を巻き取り電極体(2)の電極端縁に溶接する。これによって、コイル部材(6)及び棒材(61)の略全体が溶融して、図1に示す如く電極端縁に融着される。この際、コイル部材(6)は電極端縁と深く噛合した状態で電極端縁に融着されるので、正極や負極を構成する芯体が薄いものであっても、芯体が溶融によって破れる等の溶接不良は発生しない。この結果、巻き取り電極体(2)の各端面には、各電極と一体に繋がった複数の集電部(5)が、図3の如く放射状に形成されることになる。

【0021】尚、コイル部材(6)及び棒材(61)に代えて、図6に示す如く、複数の溝(71)が一定ピッチで凹設された櫛形部材(7)を採用することも可能であって、図7に示す如く、巻き取り電極体(2)の端部に突出する渦巻き状の電極端縁に対して櫛形部材(7)を噛合せしめ、該櫛形部材(7)に対してレーザ溶接を施す。これによって、図1に示す集電部(5)が形成されることになる。

【0022】又、コイル部材(6)等を用いることなく、図8(a)に示す如く、巻き取り電極体(2)の端部に突出する負極側の非塗工部(27)を内側に折り畳んで、該非塗工部(27)の表面によって電極端面を形成した後、図8(b)に示す如く、前記電極端面を覆って、アルミニウムなどからなる金属薄膜を放射状パターンに被着形成することによって、集電部(5)を形成することも可能である。前記金属薄膜の形成には、例えば真空蒸着法、プラズマ溶射法、メタリコン法などの周知の成膜手法を採用することが出来る。

【0023】次に、巻き取り電極体(2)の正極(21)側の集電部(5)が露出した端面に、集電部材(4)の平板部(43)を抵抗溶接した後、該巻き取り電極体(2)を負極缶(1)の内部に設置する。この際、巻き取り電極体(2)の各集電部(5)と負極缶(1)の各凸部(15)とが互いに接触する様に位置決めを行なう。この状態で、図9(a)に示す如く負極缶(1)の背面側から凸部(15)へ向けて、YAGレーザなどを用いてレーザビームを照射する。これによって、図9(b)に示す如く巻き取り電極体(2)の集電部と負極缶(1)の凸部(15)の間にナゲット(16)が形成されて、巻き取り電極体(2)の集電部と負極缶(1)の凸部(15)とが互いに溶接されることになる。

【0024】その後、正極側の集電部材(4)のタブ部(42)を封口板(11)に抵抗溶接し、負極缶(1)の内部に電解液を注入した後、封口板(11)を負極缶(1)にかしめ固定する。この結果、図1に示すリチウムイオン二次電池が完成する。

【0025】尚、本発明の各部構成は上記実施の形態に限らず、特許請求の範囲に記載の技術的範囲内で種々の変形が可能である。例えば、巻き取り電極体(2)の正極側の集電部(5)を封口板(11)に連結する構造は、図1に示す集電部材(4)を用いたものに限らず、周知の種々の連結構造を採用することが可能である。

図の説明

【図面の簡単な説明】

【図1】本発明に係るリチウムイオン二次電池の断面図である。

【図2】巻き取り電極体の一部展開斜視図である。

【図3】巻き取り電極体の端面に形成された複数の集電部を示す図である。

【図4】負極缶の底部に形成された複数の凸部を示す一部破断斜視図である。

【図5】集電部を形成する工程において、コイル部材及び棒材を取り電極体に係合させた状態の一部破断正面図である。

【図6】集電部を形成する他の方法で用いる櫛形部材の斜視図である。

【図7】櫛形部材を巻き取り電極体に係合させた状態の一部破断正面図である。

【図8】集電部を形成するための更に他の方法を示す斜視図である。

【図9】負極缶の底部に巻き取り電極体の集電部をレーザ溶接する工程を示す断面図である。

【図10】従来のリチウムイオン二次電池の断面図である。

【符号の説明】

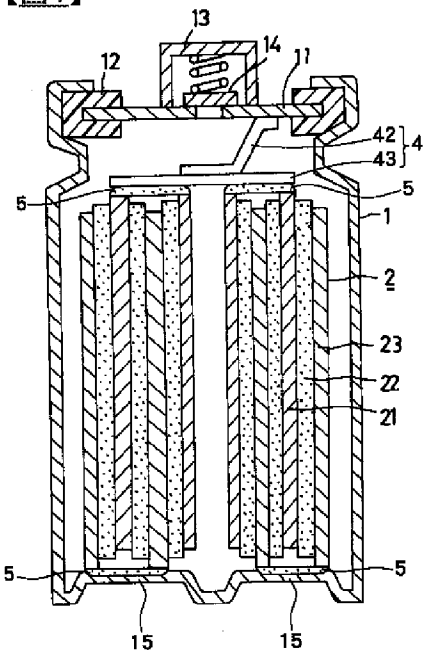
(1) 負極缶

(11) 封口板

(12) 絶縁部材
(13) 正極端子
(15) 凸部
(2) 巻き取り電極体
(21) 正極
(22) セパレータ
(23) 負極
(4) 集電部材
(5) 集電部

図面

【図1】



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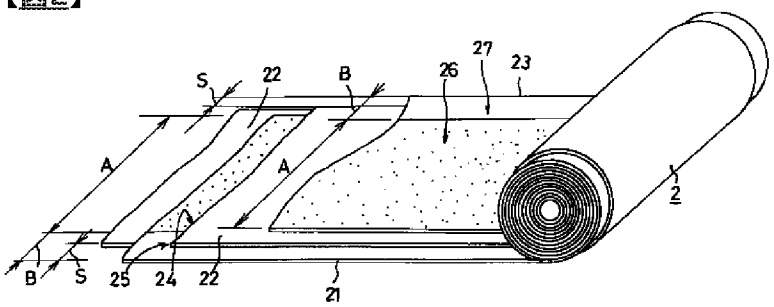
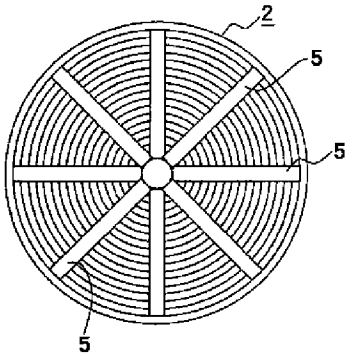
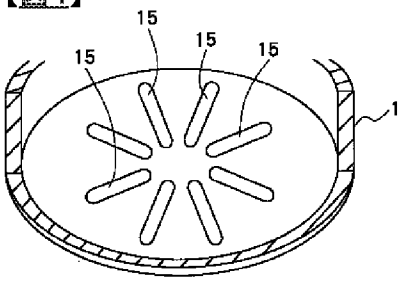


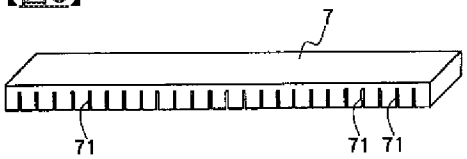
【図3】



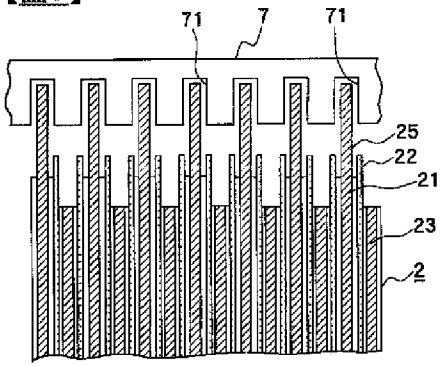
【図4】



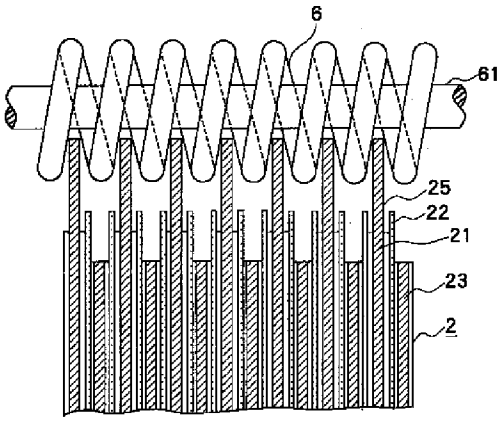
【図6】



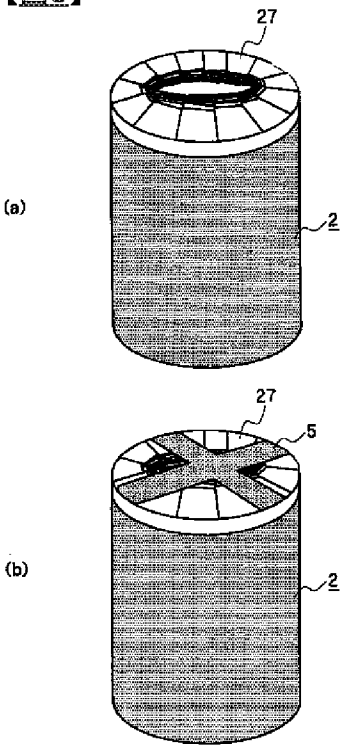
【図7】



【図5】

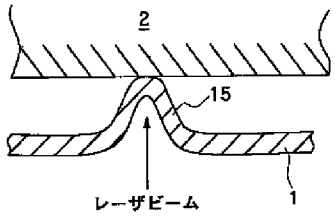


【図8】

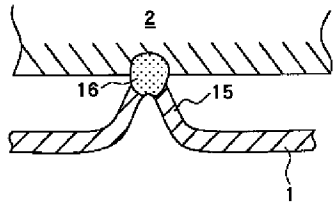


【図9】

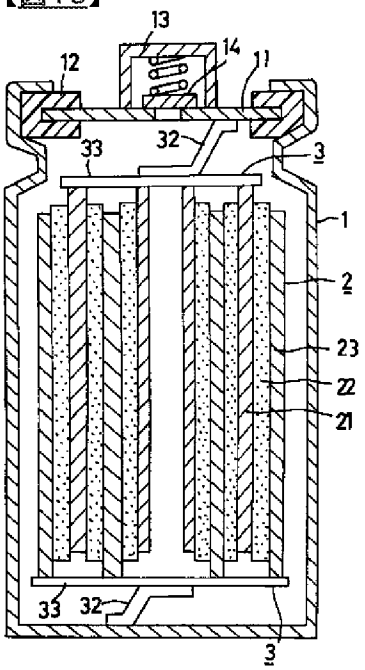
(a)



(b)



【図10】



PATENT ABSTRACTS OF JAPAN

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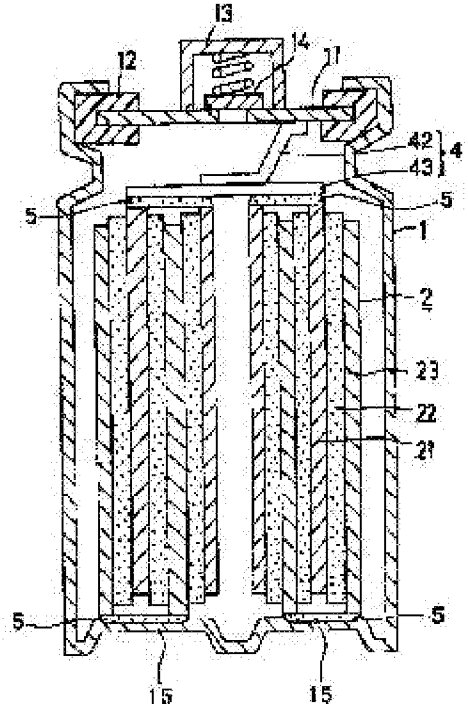
(71)Applicant : **SANYO ELECTRIC CO LTD**
SANYO ELECTRONIC COMPONENTS CO LTD
(72)Inventor : **TERASHI KAZUO**
ONO TAKUJI

(54) **ELECTRICAL ENERGY STORING DEVICE**



(57)Abstract:
PROBLEM TO BE SOLVED: To provide an electrical energy storing device with a sealing plate 11 fixed on an opening part of a bottomed metal negative electrode can 1 and a wound electrode body 2 provided inside capable of reducing the number of parts and weight.
SOLUTION: This electrical energy storing device includes a plurality of projected parts 15 projected to a side of a wound electrode body 2 integrally formed on a bottom part of a negative electrode can 1, and a plurality of current collector parts 5 respectively formed on end parts of a positive electrode 21 and a negative electrode 23 of the wound electrode body 2. Each of the projected parts 15 of the negative electrode can 1 is laser-welded to each of the current collector parts 5 of the negative electrode 23. At least one of the end parts of the electrodes is directly welded to the projected part integrally formed on the bottom part of the battery can, and a conventional current collector member is not interposed between the electrode and the electrode can. Therefore, the number of parts and the weight can be reduced.

CLAIMS

[Claim(s)]
[Claim 1]Fix an obturation board to an opening of an electrode can which presents the shape of a cylinder like object with base, form an electrode chamber in an inside, and to this electrode chamber. It is installed by electrode body (2) which makes a separator (22) come to intervene between an anode (21) and a negative electrode (23), and to an obturation board. In an electrical energy accumulating device with which an electrode terminal electrically insulated with a battery can is provided, an electrode of either one of an anode (21) and a negative electrode (23) is connected with said electrode can, and an electrode of the other is connected with said electrode terminal, An electrical energy accumulating device characterized by molding into one 1 or two or more heights (15) which project to the electrode chamber side, and welding these heights (15) to an end of said one electrode at a pars basilaris ossis occipitalis of an electrode can.
[Claim 2]An anode (21) and a negative electrode (23) apply an active material to the surface of a band-like axis, are constituted, and at least, respectively at the end of said one electrode. The electrical energy accumulating device according to claim 1 with which a non-coating part to which an active material is not applied is formed, a collecting section (5) exposed to the end face of an electrode body (2) is formed in the edge of this non-coating part, and heights (15) of said electrode can are welded to this collecting section (5).
[Claim 3]The electrical energy accumulating device according to claim 2 which makes a

weld member to which the edge of a non-coating part of said one electrode opens an interval in one end of an electrode body (2), and is located in a line with it, and a collecting section (5) engages with the edge of said non-coating part weld.
[Claim 4]The electrical energy accumulating device according to claim 2 with which folds up a non-coating part of said one electrode at one end of an electrode body (2), an electrode end surface is formed in it, and a collecting section (5) carries out covering formation of the metal thin film to said electrode end surface.
[Claim 5]The electrical energy accumulating device according to any one of claims 1 to 4 with which laser welding of the heights (15) is carried out to an end of said one electrode by irradiating with a laser beam from the rear-face side of an electrode can to heights (15).

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention]This invention relates to the structure of electrical energy accumulating devices, such as a electric double layer capacitor, a rechargeable lithium-ion battery, etc. which are used as a capacitor for storing electricity the regenerative braking energy of the power supply for the igniters of a gasoline automobile, a hybrid car, or an electromobile, etc.
[0002]
[Description of the Prior Art]As the conventional rechargeable lithium-ion battery is shown, for example in drawing 10, it rolls round inside a negative electrode can (1), an electrode body (2) is accommodated, an obturation board (11) is fixed to the opening of this negative electrode can (1), and the insulating member (12) intervenes between a negative electrode can (1) and an obturation board (11). The positive pole terminal (13) which contained the safety valve (14) is attached to the obturation board (11). By this, the electric power which a rolling-up electrode body (2) generates can be taken out from a positive pole terminal (13) and a negative electrode can (1) to the exterior.
[0003]A rolling-up electrode body (2) comprises a band-like anode (21), a separator (22), and a negative electrode (23), respectively. An anode (21) applies positive active material (24) to the surface of the axis which consists of aluminium foil, and is produced, and a negative electrode (23) applies negative electrode active material (26) to the surface of the axis which consists of copper foil, and is produced. Respectively an anode (21) and a negative electrode (23) are shifted crosswise, are piled up on a separator (22), and are rolled round spirally. By this, at one end, the edge of an anode (21) projects to the method of outside [edge / of a separator (22)] among the both ends of the shaft orientations of a rolling-up electrode body (2), and the edge of the negative electrode (23) has projected to the method of outside [edge / of a separator (22)] at the end of another side.
[0004]The collecting member (3) is installed in the both ends of a rolling-up electrode body (2), respectively. The flat part (33) to which the collecting member (3) was joined by the end face of the rolling-up electrode body (2), It has the tab part (32) which protruded on the surface of this flat part (33), the tip part of the tab part (32) of the collecting member (3) by the side of an anode is welded to the inner surface of an obturation board (11), and the tip part of the tab part (32) of the collecting member (3) by

the side of a negative electrode is welded to the bottom of the negative electrode can (1).
[0005]
[Problem(s) to be Solved by the Invention]However, in the conventional rechargeable lithium-ion battery shown in drawing 10, since the collecting member (3) and (3) was arranged on both sides of the rolling-up electrode body (2), part mark not only increase, but there was a problem to which the weight of a cell becomes large. Then, the purpose of this invention is to provide the electrical energy accumulating device in which reduction and the weight saving of part mark are possible.
[0006]
[Means for Solving the Problem]An electrical energy accumulating device concerning this invention, An obturation board is fixed to an opening of a metal electrode can which presents the shape of a cylinder like object with base, an electrode chamber is formed in an inside, an electrode body (2) which makes a separator (22) come to intervene between an anode (21) and a negative electrode (23) is installed in this electrode chamber, and an electrode terminal electrically insulated with a battery can is provided in an obturation board. 1 or two or more heights (15) which project to the electrode chamber side are molded into one by pars basilaris ossis occipitalis of an electrode can, an end of an electrode of either one of an anode (21) and a negative electrode (23) is welded to it with heights (15) of said electrode can, and an end of an electrode of the other is connected with said electrode terminal.
[0007]In an electrical energy accumulating device of above-mentioned this invention, an end of said one electrode is directly welded to heights (15) of a battery can, and it succeeds in an electrical link with a battery can. An end of an electrode of said another side is connected with an electrode terminal, for example via the same collecting member as usual, and it succeeds in an electrical link with an electrode terminal. Therefore, electric power which an electrode body (2) generates can be taken out from an electrode can and an electrode terminal to the exterior.
[0008]In a process of welding an end of said one electrode of an electrode body (2) to heights (15) of a battery can, first, an electrode body (2) is installed in an inside of a battery can, and an end of said one electrode is contacted to heights (15). Under the present circumstances, since heights (15) are projected to the battery-chamber side, an end and heights (15) of an electrode contact certainly. In this state, it irradiates with a laser beam from the rear-face side of an electrode can to heights (15). Said one end and heights (15) of an electrode will be welded by this.
[0009]An anode (21) and a negative electrode (23) apply an active material to the surface of a band-like axis, are constituted, and at least specifically, respectively at the end of said one electrode. A non-coating part to which an active material is not applied is formed, a collecting section (5) exposed to the end face of an electrode body (2) is formed in the edge of this non-coating part, and heights (15) of said electrode can are welded to this collecting section (5). In an electrical energy accumulating device which has this concrete composition, Since a collecting section (5) is formed in the edge of a non-coating part of said one electrode and the surface of this collecting section (5) is exposed to the end face of an electrode body (2), The surface of this collecting section (5) and heights (15) of an electric can will contact in a large area mutually, and electrical resistance between a collecting section (5) after welding and heights (15) will become low enough.

[0010]In concrete composition, the edge of a non-coating part of said one electrode opens an interval, and is located in a line, and a collecting section (5) makes a weld member engage with the edge of said non-coating part, and is welded to one end of an electrode body (2). Since a weld member is welded in the state where it engaged with a non-coating part of said one electrode according to this concrete composition, a collecting section (5) which was united with a non-coating part is formed.
[0011]In other concrete composition, a non-coating part of said one electrode is folded up at one end of an electrode body (2), an electrode end surface is formed in it, and a collecting section (5) carries out covering formation of the metal thin film to said electrode end surface. Since according to this concrete composition an electrode end surface which consists of the surface of this non-coating part by folding up a non-coating part is formed and covering formation of the metal thin film is carried out to this electrode end surface, a collecting section (5) which contacted a non-coating part in a large area is formed.
[0012]
[Effect of the Invention]In the electrical energy accumulating device concerning this invention, since the end of at least one electrode is directly welded to the heights really molded into the pars basilaris ossis occipitalis of the battery can and the conventional **** collecting member does not intervene between this electrode and an electrode can, reduction and the weight saving of part mark are possible.
[0013]
[Embodiment of the Invention]Hereafter, this invention is concretely explained over a drawing about the gestalt carried out to the rechargeable lithium-ion battery. As the rechargeable lithium-ion battery concerning this invention is shown in drawing 1, it rolls round inside the negative electrode can (1) of closed-end cylindrical shape, an electrode body (2) is accommodated, an obturation board (11) is fixed to the opening of a negative electrode can (1), and the insulating member (12) intervenes between a negative electrode can (1) and an obturation board (11). The positive pole terminal (13) which contained the safety valve (14) is attached to the obturation board (11). Two or more heights (15) which project to the rolling-up electrode body (2) side are really radiately molded into the pars basilaris ossis occipitalis of the negative electrode can (1), as shown in drawing 4. In the above-mentioned rechargeable lithium-ion battery, the electric power which a rolling-up electrode body (2) generates can be taken out from a positive pole terminal (13) and a negative electrode can (1) to the exterior.
[0014]It consists of a band-like anode (21), separator (22), and negative electrode (23), respectively, and, respectively an anode (21) and a negative electrode (23) are shifted crosswise, and are piled up on a separator (22), and the rolling-up electrode body (2) is spirally rolled round, as shown in drawing 2. An anode (21) applies positive active material (24) to the surface of the axis which consists of aluminium foil, and is constituted, and the non-coating part (25) to which positive active material is not applied for while being extended to an electrode longitudinal direction along the edge is formed. A negative electrode (23) applies negative electrode active material (26) to the surface of the axis which consists of copper foil, and is constituted, and the non-coating part (27) to which negative electrode active material is not applied is formed along the edge of another side extended to an electrode longitudinal direction.
[0015]By this, at one end, among the both ends of the shaft orientations of a rolling-up

electrode body (2). The edge (non-coating part (25)) of the anode (21) rolled round spirally projects to the method of outside [edge / of a separator (22)], and in the end of another side. The edge (non-coating part (27)) of the negative electrode (23) rolled round spirally will project to the method of outside [edge / of a separator (22)] (refer to drawing 5). For example, as for the width A of the active material coating part (24) of each electrode, and (26), the width B of tens of mm, a non-coating part (25), and (27) can form the projection distance S from several millimeters and a separator (22) in about 1-3 mm.

[0016]Two or more collecting sections (5) are radiately formed in the both ends of a rolling-up electrode body (2), respectively, as shown in drawing 3. As each collecting section (5) welds the below-mentioned weld member and it is shown in drawing 1, the collecting section (5) by the side of an anode is formed in the edge of the anode (21) of a rolling-up electrode body (2) at one, and the collecting section (5) by the side of a negative electrode is formed in the edge of the negative electrode (23) of a rolling-up electrode body (2) at one.

[0017]The collecting member made from aluminum (4) is installed in the surface of the collecting section (5) by the side of an anode (21). This collecting member (4) is provided with the flat part (43) which spreads along the end face of a rolling-up electrode body (2), and the tab part (42) which protruded on the surface of a flat part (43), and the rear face of a flat part (43) is welded by resistance on the surface of a collecting section (5), and. The tip part of the tab part (42) is welded by resistance to the rear face of the obturation board (11). A rolling-up electrode body (2) makes each collecting section (5) by the side of a negative electrode (23) correspond to each heights (15) of a negative electrode can (1), and is installed, the tip of heights (15) rolls it round and laser welding is carried out to the collecting section (5) of the electrode body (2).

[0018]In the above-mentioned rechargeable lithium-ion battery, to the both ends of a rolling-up electrode body (2), respectively, The collecting section (5) of an electrode end edge and one is formed, the touch area between a collecting section (5) and a collecting member (4) and between a collecting section (5) and the heights (15) of a negative electrode can (1) is large enough, and since contact resistance is fully reduced, high collecting efficiency is acquired. Positive contact between the collecting section (5) by the side of the negative electrode of a rolling-up electrode body (2) and a negative electrode can (1) is achieved by the heights (15) really molded into the negative electrode can (1), Since a collecting member does not intervene between this collecting section (5) and a negative electrode can (1), compared with the composition which rolled round like the former and has arranged the collecting member (4) and (4) on both sides of an electrode body (2), reduction of part mark and the weight saving of a cell are possible.

[0019]Next, the manufacturing method of the above-mentioned rechargeable lithium-ion battery is explained. After producing the rolling-up electrode body (2) shown in drawing 2 as usual, as shown in drawing 5, Two or more coil members made from aluminum (6) are arranged radiately, the edge (25), i.e., the non-coating part, of the spiral anode (21) projected at the end of the rolling-up electrode body (2), are engaged to it, and are closed to it, and the center section of each coil member (6) is made to penetrate the bar made from aluminum (61). Two or more copper coil members (6) are arranged radiately, the edge (27), i.e., the non-coating part, of a spiral negative electrode (23), are engaged to it, and are closed to it, and the center section of each coil member (6) is made similarly to

penetrate copper bars (61).
[0020]Then, to the installation section of each coil member (6) and a bar (61), laser welding using an YAG laser etc. is performed, a coil member (6) and a bar (61) are rolled round, and it welds to the electrode end edge of an electrode body (2). Abbreviated [of a coil member (6) and a bar (61) / whole] fuses, and as shown in drawing 1, it is welded to an electrode end edge by this. Under the present circumstances, since a coil member (6) is welded to an electrode end edge in the state where it geared with the electrode end edge deeply, even if the axis which constitutes an anode and a negative electrode is thin, a poor weld, like an axis is torn by melting is not generated. As a result, two or more collecting sections (5) connected with each electrode and one will be radiately formed in each end face of a rolling-up electrode body (2) like drawing 3.
[0021]As it replaces with a coil member (6) and a bar (61) and is shown in drawing 6, As two or more slots (71) are able to adopt the Kushigata member (7) cut at constant pitch and it is shown in drawing 7, the Kushigata member (7) is engaged and closed to the spiral electrode end edge which projects at the end of a rolling-up electrode body (2), and laser welding is performed to this Kushigata member (7). Of this, the collecting section (5) shown in drawing 1 will be formed.
[0022]Without using a coil member (6) etc., as shown in drawing 8 (a), the non-coating part (27) by the side of the negative electrode which projects at the end of a rolling-up electrode body (2) is folded up inside, After forming an electrode end surface by the surface of this non-coating part (27), as shown in drawing 8 (b), it is also possible to form a collecting section (5) by covering said electrode end surface and carrying out covering formation of the metal thin film which consists of aluminum etc. to a radiate pattern. The membrane formation technique of common knowledge of a vacuum deposition method, a plasma spray process, a metalikon process, etc. is employable as formation of said metal thin film, for example.
[0023]Next, after welding the flat part (43) of a collecting member (4) by resistance to the end face which the collecting section (5) by the side of the anode (21) of a rolling-up electrode body (2) exposed, this rolling-up electrode body (2) is installed in the inside of a negative electrode can (1). Under the present circumstances, it positions so that each collecting section (5) of a rolling-up electrode body (2) and each heights (15) of a negative electrode can (1) may contact mutually. In this state, as shown in drawing 9 (a), it irradiates with a laser beam towards heights (15) using an YAG laser etc. from the back side of a negative electrode can (1). Of this, it will roll round, as shown in drawing 9 (b), and a nugget (16) will be formed between the collecting section of an electrode body (2), and the heights (15) of a negative electrode can (1), and the collecting section of a rolling-up electrode body (2) and the heights (15) of a negative electrode can (1) will be mutually welded.
[0024]Then, after welding by resistance the tab part (42) of the collecting member (4) by the side of an anode to an obturation board (11) and injecting an electrolysis solution into the inside of a negative electrode can (1), caulking immobilization of the obturation board (11) is carried out at a negative electrode can (1). As a result, the rechargeable lithium-ion battery shown in drawing 1 is completed.
[0025]Various modification is possible for each part composition of this invention in a technical scope given not only in the above-mentioned embodiment but a claim. For example, the structure which connects the collecting section (5) by the side of the anode

of a rolling-up electrode body (2) with an obturation board (11) can adopt not only the thing using the collecting member (4) shown in drawing 1 but well-known various joining structures.

EFFECT OF THE INVENTION

[Effect of the Invention]In the electrical energy accumulating device concerning this invention, since the end of at least one electrode is directly welded to the heights really molded into the pars basilaris ossis occipitalis of the battery can and the conventional **** collecting member does not intervene between this electrode and an electrode can, reduction and the weight saving of part mark are possible.

[0013]

[Embodiment of the Invention]Hereafter, this invention is concretely explained over a drawing about the gestalt carried out to the rechargeable lithium-ion battery. As the rechargeable lithium-ion battery concerning this invention is shown in drawing 1, it rolls round inside the negative electrode can (1) of closed-end cylindrical shape, an electrode body (2) is accommodated, an obturation board (11) is fixed to the opening of a negative electrode can (1), and the insulating member (12) intervenes between a negative electrode can (1) and an obturation board (11). The positive pole terminal (13) which contained the safety valve (14) is attached to the obturation board (11). Two or more heights (15) which project to the rolling-up electrode body (2) side are really radiately molded into the pars basilaris ossis occipitalis of the negative electrode can (1), as shown in drawing 4. In the above-mentioned rechargeable lithium-ion battery, the electric power which a rolling-up electrode body (2) generates can be taken out from a positive pole terminal (13) and a negative electrode can (1) to the exterior.

[0014]It consists of a band-like anode (21), separator (22), and negative electrode (23), respectively, and, respectively an anode (21) and a negative electrode (23) are shifted crosswise, and are piled up on a separator (22), and the rolling-up electrode body (2) is spirally rolled round, as shown in drawing 2. An anode (21) applies positive active material (24) to the surface of the axis which consists of aluminium foil, and is constituted, and the non-coating part (25) to which positive active material is not applied for while being extended to an electrode longitudinal direction along the edge is formed. A negative electrode (23) applies negative electrode active material (26) to the surface of the axis which consists of copper foil, and is constituted, and the non-coating part (27) to which negative electrode active material is not applied is formed along the edge of another side extended to an electrode longitudinal direction.

[0015]By this, at one end, among the both ends of the shaft orientations of a rolling-up electrode body (2). The edge (non-coating part (25)) of the anode (21) rolled round spirally projects to the method of outside [edge / of a separator (22)], and in the end of another side. The edge (non-coating part (27)) of the negative electrode (23) rolled round spirally will project to the method of outside [edge / of a separator (22)] (refer to drawing 5). For example, as for the width A of the active material coating part (24) of each electrode, and (26), the width B of tens of mm, a non-coating part (25), and (27) can form the projection distance S from several millimeters and a separator (22) in about 1-3 mm.

[0016]Two or more collecting sections (5) are radiately formed in the both ends of a

rolling-up electrode body (2), respectively, as shown in drawing 3. As each collecting section (5) welds the below-mentioned weld member and it is shown in drawing 1, the collecting section (5) by the side of an anode is formed in the edge of the anode (21) of a rolling-up electrode body (2) at one, and the collecting section (5) by the side of a negative electrode is formed in the edge of the negative electrode (23) of a rolling-up electrode body (2) at one.
[0017]The collecting member made from aluminum (4) is installed in the surface of the collecting section (5) by the side of an anode (21). This collecting member (4) is provided with the flat part (43) which spreads along the end face of a rolling-up electrode body (2), and the tab part (42) which protruded on the surface of a flat part (43), and the rear face of a flat part (43) is welded by resistance on the surface of a collecting section (5), and. The tip part of the tab part (42) is welded by resistance to the rear face of the obturation board (11). A rolling-up electrode body (2) makes each collecting section (5) by the side of a negative electrode (23) correspond to each heights (15) of a negative electrode can (1), and is installed.
The tip of heights (15) rolls round and laser welding is carried out to the collecting section (5) of the electrode body (2).

[0018]In the above-mentioned rechargeable lithium-ion battery, to the both ends of a rolling-up electrode body (2), respectively, The collecting section (5) of an electrode end edge and one is formed, the touch area between a collecting section (5) and a collecting member (4) and between a collecting section (5) and the heights (15) of a negative electrode can (1) is large enough, and since contact resistance is fully reduced, high collecting efficiency is acquired. Positive contact between the collecting section (5) by the side of the negative electrode of a rolling-up electrode body (2) and a negative electrode can (1) is achieved by the heights (15) really molded into the negative electrode can (1), Since a collecting member does not intervene between this collecting section (5) and a negative electrode can (1), compared with the composition which rolled round like the former and has arranged the collecting member (4) and (4) on both sides of an electrode body (2), reduction of part mark and the weight saving of a cell are possible.
[0019]Next, the manufacturing method of the above-mentioned rechargeable lithium-ion battery is explained. After producing the rolling-up electrode body (2) shown in drawing 2 as usual, as shown in drawing 5, Two or more coil members made from aluminum (6) are arranged radiately, the edge (25), i.e., the non-coating part, of the spiral anode (21) projected at the end of the rolling-up electrode body (2), are engaged to it, and are closed to it, and the center section of each coil member (6) is made to penetrate the bar made from aluminum (61). Two or more copper coil members (6) are arranged radiately, the edge (27), i.e., the non-coating part, of a spiral negative electrode (23), are engaged to it, and are closed to it, and the center section of each coil member (6) is made similarly to penetrate copper bars (61).

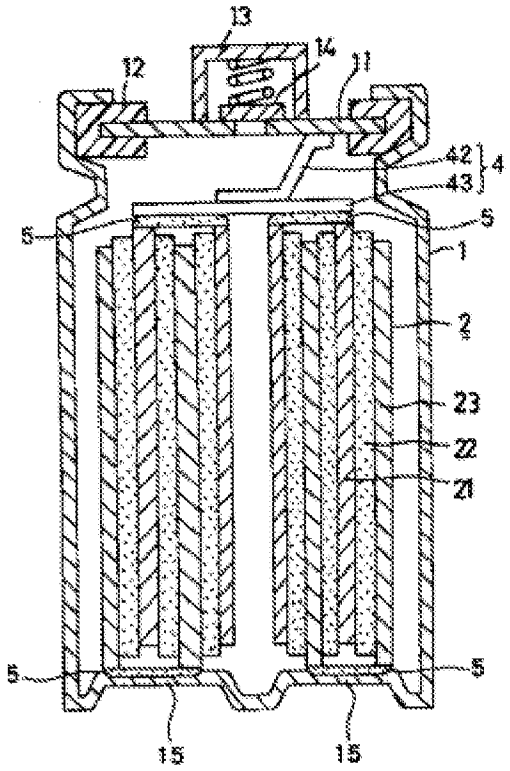
TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention]However, in the conventional rechargeable lithium-ion battery shown in drawing 10, since the collecting member (3) and (3) was arranged on both sides of the rolling-up electrode body (2), part mark not only increase,

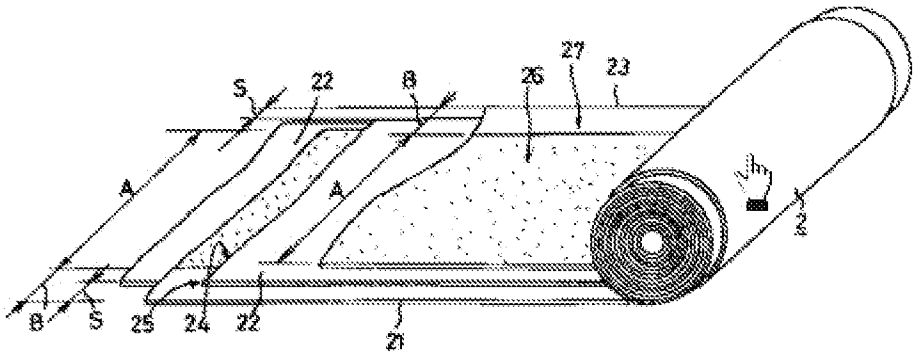
but there was a problem to which the weight of a cell becomes large. Then, the purpose of this invention is to provide the electrical energy accumulating device in which reduction and the weight saving of part mark are possible.

DESCRIPTION OF DRAWINGS

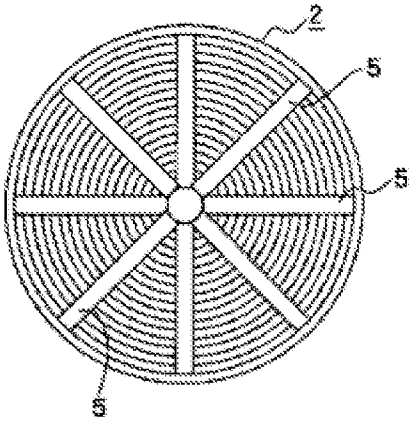
[Brief Description of the Drawings]
[Drawing 1]It is a sectional view of the rechargeable lithium-ion battery concerning this invention.



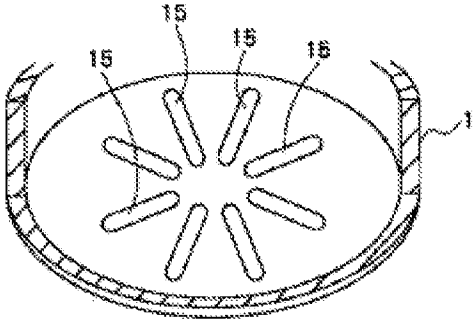
[Drawing 2]It is a partial deployment perspective view of a rolling-up electrode body.



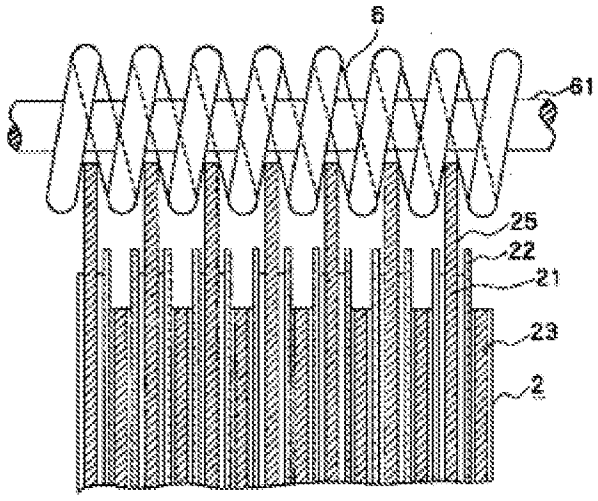
[Drawing 3]It is a figure showing two or more collecting sections formed in the end face of a rolling-up electrode body.



[Drawing 4]two or more heights formed in the pars basilaris ossis occipitalis of a negative electrode can are shown -- it is a fracture perspective view in part.



[Drawing 5]In the process of forming a collecting section, it is a partial fracture front view in the state where took the coil member and the bar and it was made to engage with an electrode body.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